

CLAIMS

1. Die set for forming cartridge cases (1;101), characterized in that it comprises at least three support elements, i.e. an upper element (1100), middle element (1200) and bottom element (1300), which are connected together in the longitudinal direction by guide columns (1001) along which said upper support (1100) and bottom support (1300) are actuated displaceably relative to each other in predefined working sequences.

2. Die set according to Claim 1, characterized in that said upper support element (1100) and bottom support element (1300) are movable relative to the fixed middle element (1200).

3. Die set according to Claim 2, characterized in that said middle support element (1200) comprises means (1230) for shearing and means (1240) for forming the case (1;100) able to co-operate with corresponding locating means (1330,1340) associated with said bottom support element (1300).

4. Die set according to Claim 3, characterized in that said means (1230) for shearing and means (1240) for forming the case (1;101) comprise a sleeve (1210) extending in the axial direction and constrained to the middle support element by means of internally threaded elements (1211) suitable for mating with the threaded opposite ends (1210a) of the said sleeve.

5. Die set according to Claim 3, characterized in that said means (1230) for shearing and means (1240) for forming the case (1;101) comprise a blanking punch (1230) arranged inside the sleeve (1210) and coaxially arranged so as to extend outside the side of the middle

support element (1200) directed towards the bottom element (1300).

6. Die set according to Claim 5, characterized in  
5 that the opposite ends of said blanking punch (1230)  
are respectively locked inside said sleeve (1210) and  
axially project towards the outside of the middle  
support element.

10 7. Die set according to Claim 4, characterized in  
that said sleeve (1210) has, arranged coaxially inside  
it, a containing bush (1220) housing internally an  
adjustable-load spring (1221), the opposite ends of  
which bear respectively against a closing element  
15 (1222) and against the said blanking punch (1230).

8. Die set according to Claim 3, characterized in  
that said forming means comprise a drawing punch (1240)  
integral with one end of a rod (1241), the opposite end  
20 of which is integrally fixed to the upper support  
element (1100) with the arrangement of a spring (1243)  
in between.

9. Die set according to Claim 8, characterized in  
25 that said rod (1241) has passing through it axially a  
duct (1242) for supplying air to the drawing punch  
(1240).

10. Die according to Claim 8, characterized in that  
30 said rod (1241) passes coaxially through the closing  
element (1222) and the spring (1221).

11. Die set according to Claim 8, characterized in  
that the end part of the drawing punch (1240) directed  
35 towards the top part of the die set has a seat (1245a)  
able to contain a shearing ring (1245).

12. Die set according to Claim 8, characterized in that the end part of the blanking punch (1240) has an axial seat (1241) able to contain the boring tip 5 (1353).

13. Die set according to Claim 1, characterized in that the bottom support element (1300) has, inserted inside it, a shearing die (1330).

10 14. Die set according to Claim 13, characterized in that the bottom support element (1300) has, inserted inside it, a drawing die (1340) coaxial with said shearing die (1330).

15 15. Die set according to Claim 1, characterized in that the bottom support element (1300) has, inserted inside it, an extractor (1360).

20 16. Die set according to Claim 1, characterized in that the bottom support element (1300) has, inserted inside it, a boring punch (1350).

25 17. Die set according to Claim 13, characterized in that the shearing die (1330) is axially fixed to the bottom support element (1300).

30 18. Die set according to Claim 14, characterized in that the drawing die (1340) is axially fixed to the bottom support element (1300).

19. Die set according to Claim 16, characterized in that the boring punch (1350) is axially fixed to the bottom support element (1300).

35 20. Die set according to Claim 15, characterized in

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that said extractor (1360) comprises a cup member (1361) movable axially against the thrusting action of spring means (1362).

5 21. Die set according to Claim 20, characterized in that said cup member (1361) has a coaxial opening (1361a) able to allow means (1350) for boring the case (1;101) to pass through.

10 22. Die set according to Claim 16, characterized in that said boring punch (1350) comprises a tip (1353) integral with the top end of a column (1352).

15 23. Die set according to Claim 22, characterized in that the boring punch (1352) comprises an annular surface (1370) arranged coaxially with the said punch and at a suitable axial distance from the boring tip (1353), the said annular surface being provided with reliefs (1371,1372) for engraving the bottom of the  
20 case (1;101).

24. Die set according to Claim 23, characterized in that the forming punch (1240) envisages a free surface for making contact with the disk (10), associated with  
25 a surface (1270) on which recesses (1271,1272) corresponding to the reliefs (1371,1372) on the annular engraving surface (1370) are formed.

25 25. Die set according to Claim 1, characterized in that it comprises an element (1310) for axially closing the seat housing the said boring means (1350).

30 26. Die set according to Claim 1, characterized in that said case (101) has a surface graphically pre-  
35 printed in one or more colours.

27. Machine for forming a case (1;101), characterized in that it comprises a die set comprising at least three support elements, i.e. upper element (1100), middle element (1200) and bottom element (1300), which 5 are connected together in the longitudinal direction by guide columns (1001) and/or by sliding surfaces along which said upper support element (1100), middle support element (1200) and bottom support element (1300) are actuated displaceably relative to each other in 10 predefined working sequences.

28. Machine according to Claim 27, characterized in that it is a press.

15 29. Machine according to Claim 27, characterized in that said middle support element (1200) is fixed.

20 30. Machine according to Claim 27, characterized in that said middle support element (1200) comprises shearing means (1230) and means (1240) for forming the case (1;101), able to co-operate with corresponding means (1330,1340) associated with said bottom support element (1300).

25 31. Machine according to Claim 30, characterized in that said shearing means (1230) and means (1240) for forming the case (1;101) comprise a sleeve (1210) extending in the axial direction and constrained to the middle support element by means of internally threaded 30 elements (1211) suitable for mating with the threaded opposite ends (1210a) of the said sleeve.

35 32. Machine according to Claim 30, characterized in that said means (1230) for shearing and means (1240) for forming the case (1;101) comprise a blanking punch (1230) arranged inside the sleeve (1210) and coaxially

arranged so as to extend outside the side of the middle support element (1200) directed towards the bottom element (1300).

5 33. Machine according to Claim 32, characterized in that the opposite ends of said blanking punch (1230) are respectively locked inside said sleeve (1210) and axially project towards the outside of the middle support element.

10 34. Machine according to Claim 31, characterized in that said sleeve (1210) has, arranged coaxially inside it, a containing bush (1220) housing internally an spring (1221), the opposite ends of which bear 15 respectively against a closing element (1222) and against said blanking punch (1230).

20 35. Machine according to Claim 30, characterized in that said forming means comprise a drawing punch (1240) integral with one end of a rod (1241), the opposite end of which is integrally joined to the upper support element (1100) with the arrangement of a spring (1243) 25 in between.

30 36. Machine according to Claim 35, characterized in that said rod (1241) has passing through it axially a duct (1242) for supplying air to the drawing punch (1240).

35 37. Machine according to Claim 35, characterized in that said rod (1241) passes coaxially through the closing element (1222) and the spring (1221).

38. Machine according to Claim 35, characterized in 35 that the end part of the drawing punch (1240) directed towards the inside of the middle support element (1200)

has a seat (1245a) able to contain a shearing ring (1245).

39. Machine according to Claim 35, characterized in  
5 that the end part of the drawing punch (1240) directed  
towards the upper support of the die set has a seat  
(1241) able to contain the tip (1353) of the boring  
punch (1352).

10 40. Machine according to Claim 27, characterized in  
that the bottom support element (1300) has, inserted  
inside it, a shearing die (1330).

15 41. Machine according to Claim 27, characterized in  
that the bottom support element (1300) has, inserted  
inside it, a drawing die (1340) coaxial with said  
shearing die (1330).

20 42. Machine according to Claim 27, characterized in  
that the bottom support element (1300) has, inserted  
inside it, an extractor.

25 43. Machine according to Claim 27, characterized in  
that the bottom support element (1300) has, inserted  
inside it, a boring punch (1350).

44. Machine according to Claim 40, characterized in  
that the shearing die (1330) is axially fixed to the  
bottom support element (1300).

30 45. Machine according to Claim 41, characterized in  
that the drawing die (1340) is axially fixed to the  
bottom support element (1300).

35 46. Machine according to Claim 43, characterized in  
that the boring punch (1350) is axially fixed to the

bottom support element (1300).

47. Machine according to Claim 42, characterized in that said extractor (1360) is formed by a cup member (1361) movable axially against the thrusting action of spring means (1362).

48. Machine according to Claim 47, characterized in that said cup member (1361) has an opening (1361a) allowing means for boring the bottom of the case (1;101) to pass through.

49. Machine according to Claim 43, characterized in that said boring punch (1350) comprises a tip (1353) integral with the top end of a column (1352).

50. Machine according to Claim 43, characterized in that said boring punch (1352) comprises an annular surface (1370) arranged coaxially with the said punch and at a suitable axial distance from the boring tip (1353), the said annular surface being provided with reliefs (1371,1372) for engraving the bottom of the case (1;101).

51. Machine according to Claim 50, characterized in that the forming punch (1240) envisages a free surface associated with a surface (1270) on which recesses (1271,1272) corresponding to reliefs on the annular engraving surface are formed.

52. Machine according to Claim 27, characterized in that it comprises an element (1310) for axially closing the seat housing the said boring means (1350).

53. Machine according to Claim 27, characterized in that said case (101) has a pre-printed surface.

54. Method for forming a cartridge case (1; 101), characterized in that it comprises the following steps:

- 5 e) supplying a sheet of metal (10) to a forming machine (20);
- f) forming and boring the case (1;101) in a single stage;
- g) extraction of the formed and bored case (1;101).

10 55. Method according to Claim 54, characterized in that said metal sheet (10) is cut to a predefined size.

56. Method according to Claim 54, characterized in that said forming operation is a drawing operation.

15 57. Method according to Claim 54, characterized in that said forming and boring operations are performed by three coaxial movements of a forming die set.

20 58. Method according to Claim 54, characterized in that the case obtained (1;101) has a substantially constant thickness along the side surface and bottom.

25 59. Method according to Claim 54, characterized in that it comprises a further step for widening the bottom (1b) of the case (1;101).

30 60. Method according to Claim 54, characterized in that it comprises a further step for printing the bottom (1b) and/or the external side surface of the case (1;101).

35 61. Method according to Claim 60, characterized in that said further printing step is performed in-line.

62. Method according to Claim 60, characterized in

that said further printing step consists in tampography, serigraphy or printing with an electronic pen.

5 63. Method according to Claim 54, characterized in that the material used for forming the case is steel.

10 64. Method according to Claim 63, characterized in that the said material is preferably steel lined electrolytically and/or suitable for combination with a film of metal such as brass, stainless steel, zinc, aluminium, titanium, copper and/or plastic.

15 65. Method according to Claim 63, characterized in that said material is preferably steel lined with tin.

66. Method according to Claim 63, characterized in that the case (1;101) comprises a further step for painting the cut edges.

20 67. Method according to Claim 65, characterized in that said painting is performed by means of electrophoresis.

25 68. Method according to Claim 54, characterized in that said material is preferably aluminium and alloys thereof.

30 69. Method according to Claim 54, characterized in that it comprises the following steps) downstream of the step for cutting the sheet (10) and upstream of the step for forming the case (1;101):

- b) lithographic printing of a surface of the sheet (10;
- 35 c) varnishing the printed sheet (10) with a layer of protective varnish;

d) polymerization of the print and the varnish.

70. Method according to Claim 69, characterized in that the protective varnish applied to the print is of 5 the polyester, epoxy ureic, polyurethane, epoxide type containing zirconium or water.

71. Method according to Claim 69, characterized in that polymerization of the print and the varnish is 10 performed using hot air.

72. Method according to Claim 71, characterized in that the temperature of the hot-air oven is kept between 180° and 220°C.

15 73. Method according to Claim 72, characterized in that the temperature of the hot-air oven is preferably kept between 195° and 205°C.

20 74. Method according to Claim 69, characterized in that polymerization of the print and the varnish is performed using UV rays.

25 75. Method according to Claim 54 or 69, characterized in that it envisages a step involving engraving of the bottom of the case during boring thereof.

30 76. Case obtained using the method according to Claim 69, characterized in that it has a surface graphically pre-printed before the step for forming thereof.